

**Appendix E**

**Supporting Data**

**2008 SBOO Stations**

**Demersal Fishes and Megabenthic Invertebrates**



## Appendix E.1

Summary of demersal fish species captured during 2008 at SBOO stations. Data are number of fish (n), biomass (kg, wet weight), minimum (Min), maximum (Max), and mean length (cm, standard length). Taxonomic arrangement and scientific names are of Eschmeyer and Herald (1998) and Allen (2005).

| Taxon/Species            | Common Name                      | n                       | BM  | Length |     |      |  |  |  |
|--------------------------|----------------------------------|-------------------------|-----|--------|-----|------|--|--|--|
|                          |                                  |                         |     | Min    | Max | Mean |  |  |  |
| <b>RAJIFORMES</b>        |                                  |                         |     |        |     |      |  |  |  |
| Platyrhinidae            |                                  |                         |     |        |     |      |  |  |  |
|                          | <i>Platyrhinoidis triseriata</i> | thornback               | 1   | 1.2    | 58  | 58   |  |  |  |
| Rhinobatidae             |                                  |                         |     |        |     |      |  |  |  |
|                          | <i>Rhinobatos productus</i>      | shovelnose guitarfish   | 2   | 0.6    | 29  | 46   |  |  |  |
| Rajidae                  |                                  |                         |     |        |     |      |  |  |  |
|                          | <i>Raja inornata</i>             | California skate        | 5   | 4.6    | 25  | 62   |  |  |  |
| <b>MYLIOBATIFORMES</b>   |                                  |                         |     |        |     |      |  |  |  |
| Urolophidae              |                                  |                         |     |        |     |      |  |  |  |
|                          | <i>Urobatis haller</i>           | round stingray          | 1   | 0.7    | 36  | 36   |  |  |  |
| <b>AULOPIFORMES</b>      |                                  |                         |     |        |     |      |  |  |  |
| Synodontidae             |                                  |                         |     |        |     |      |  |  |  |
|                          | <i>Synodus lucioceps</i>         | California lizardfish   | 175 | 5.8    | 8   | 24   |  |  |  |
| <b>OPHIDIIFORMES</b>     |                                  |                         |     |        |     |      |  |  |  |
| Ophidiidae               |                                  |                         |     |        |     |      |  |  |  |
|                          | <i>Chilara taylori</i>           | spotted cusk-eel        | 1   | 0.1    | 12  | 12   |  |  |  |
| <b>Batrachoidiformes</b> |                                  |                         |     |        |     |      |  |  |  |
| Batrachoididae           |                                  |                         |     |        |     |      |  |  |  |
|                          | <i>Porichthys myriaster</i>      | specklefin midshipman   | 18  | 0.8    | 6   | 18   |  |  |  |
|                          | <i>Porichthys notatus</i>        | plainfin midshipman     | 27  | 1.1    | 4   | 16   |  |  |  |
| <b>SYNGNATHIFORMES</b>   |                                  |                         |     |        |     |      |  |  |  |
| Syngnathidae             |                                  |                         |     |        |     |      |  |  |  |
|                          | <i>Syngnathus californiensis</i> | kelp pipefish           | 6   | 0.3    | 15  | 22   |  |  |  |
| <b>SCORPAENIFORMES</b>   |                                  |                         |     |        |     |      |  |  |  |
| Scorpaenidae             |                                  |                         |     |        |     |      |  |  |  |
|                          | <i>Scorpaena guttata</i>         | California scorpionfish | 28  | 10.5   | 10  | 29   |  |  |  |
|                          | <i>Sebastes dallii</i>           | calico rockfish         | 1   | 0.1    | 4   | 4    |  |  |  |
| Hexagrammidae            |                                  |                         |     |        |     |      |  |  |  |
|                          | <i>Zaniolepis latipinnis</i>     | longspine combfish      | 118 | 4.3    | 12  | 16   |  |  |  |
| Cottidae                 |                                  |                         |     |        |     |      |  |  |  |
|                          | <i>Chitonotus pugetensis</i>     | roughback sculpin       | 630 | 6.2    | 4   | 12   |  |  |  |
|                          | <i>Icelinus quadriseriatus</i>   | yellowchin sculpin      | 524 | 3.2    | 4   | 8    |  |  |  |
| Agonidae                 |                                  |                         |     |        |     |      |  |  |  |
|                          | <i>Odontopyxix trispinosa</i>    | pygmy poacher           | 2   | 0.2    | 5   | 7    |  |  |  |
| Liparidae                |                                  |                         |     |        |     |      |  |  |  |
|                          | <i>Lipanis moculosus</i>         | slimy snailfish         | 1   | 0.1    | 3   | 3    |  |  |  |
| <b>PERCIFORMES</b>       |                                  |                         |     |        |     |      |  |  |  |
| Serranidae               |                                  |                         |     |        |     |      |  |  |  |
|                          | <i>Paralabrax nebulifer</i>      | barred sand bass        | 1   | 0.8    | 31  | 31   |  |  |  |
| Sciaenidae               |                                  |                         |     |        |     |      |  |  |  |
|                          | <i>Seriphis politus</i>          | queenfish               | 10  | 0.5    | 13  | 15   |  |  |  |
|                          | <i>Umbrina roncador</i>          | yellowfin croaker       | 98  | 8.6    | 13  | 24   |  |  |  |
| Embiotocidae             |                                  |                         |     |        |     |      |  |  |  |
|                          | <i>Cymatogaster aggregata</i>    | shiner perch            | 2   | 0.2    | 8   | 11   |  |  |  |
|                          | <i>Zalembius rosaceus</i>        | pink seaperch           | 4   | 0.3    | 5   | 12   |  |  |  |

## Appendix E.1 *continued*

| Taxon/Species                                    | Common Name           | n    | BM   | Length |     |      |
|--|-----------------------|------|------|--------|-----|------|
|  |                       |      |      | Min    | Max | Mean |
| Clinidae<br><i>Heterostichus rostratus</i>       | giant kelpfish        | 1    | 0.1  | 17     | 17  | 17   |
| Chaenopsidae<br><i>Neoclinus blanchardi</i>      | sarcastic fringehead  | 1    | 0.1  | 11     | 11  | 11   |
| Labrisomidae<br><i>Cryptotrema corallimun</i>    | deepwater blenny      | 1    | 0.1  | 3      | 3   | 3    |
| Stromateidae<br><i>Peprilus simillimus</i>       | Pacific pompano       | 485  | 6.3  | 6      | 10  | 8    |
| <b>PLEURONECTIFORMES</b>                         |                       |      |      |        |     |      |
| Paralichthyidae<br><i>Citharichthys sordidus</i> | Pacific sanddab       | 2    | 0.2  | 15     | 16  | 16   |
| <i>Citharichthys stigmaeus</i>                   | speckled sanddab      | 3659 | 32.9 | 3      | 13  | 8    |
| <i>Citharichthys xanthostigma</i>                | longfin sanddab       | 138  | 9.7  | 6      | 20  | 14   |
| <i>Hippoglossina stomata</i>                     | bigmouth sole         | 4    | 0.5  | 17     | 23  | 19   |
| <i>Paralichthys californicus</i>                 | California halibut    | 14   | 14.1 | 23     | 53  | 35   |
| <i>Xystreurus liolepis</i>                       | fantail sole          | 7    | 1.3  | 18     | 25  | 21   |
| Pleuronectidae<br><i>Parophrys vetulus</i>       | English sole          | 89   | 7.7  | 8      | 26  | 15   |
| <i>Pluronichthys decurrens</i>                   | curlfin sole          | 2    | 0.1  | 5      | 6   | 6    |
| <i>Pleuronichthys ritteri</i>                    | spotted turbot        | 6    | 1.4  | 16     | 19  | 18   |
| <i>Pleuronichthys verticalis</i>                 | hornyhead turbot      | 124  | 8.5  | 4      | 21  | 11   |
| Cynoglossidae<br><i>Symphurus atricauda</i>      | California tonguefish | 33   | 1.8  | 7      | 16  | 11   |

## Appendix E.2

Summary of total abundance by species and station for demersal fishes at the SBOO stations during 2008.

| Name                    | January 2008 |      |      |      |      |      |      | Total abundance<br>by survey |
|-------------------------|--------------|------|------|------|------|------|------|------------------------------|
|                         | SD15         | SD16 | SD17 | SD18 | SD19 | SD20 | SD21 |                              |
| Speckled sanddab        | 53           | 258  | 159  | 186  | 231  | 225  | 124  | 1236                         |
| Roughback sculpin       | 10           | 47   | 28   | 32   | 28   | 21   | 12   | 178                          |
| Longspine combfish      |              | 11   | 2    | 17   | 6    | 8    | 12   | 56                           |
| Hornyhead turbot        |              | 4    | 5    | 9    | 9    | 6    | 3    | 36                           |
| California lizardfish   | 1            | 5    | 1    | 7    |      | 12   | 2    | 28                           |
| English sole            | 1            |      | 5    | 5    | 4    | 2    | 3    | 20                           |
| Longfin sanddab         |              | 1    | 2    | 10   |      |      |      | 13                           |
| Specklefin midshipman   |              | 3    | 1    |      | 1    | 6    |      | 11                           |
| California halibut      |              |      | 4    | 1    |      |      | 2    | 7                            |
| California tonguefish   |              |      |      | 1    | 1    | 2    | 1    | 6                            |
| Kelp pipefish           |              | 2    | 3    |      |      |      |      | 5                            |
| Plainfin midshipman     |              |      | 2    |      |      |      | 3    | 5                            |
| California skate        |              | 1    | 1    |      |      |      |      | 2                            |
| Fantail sole            | 1            |      |      |      |      |      | 1    | 2                            |
| Yellowchin sculpin      |              |      | 2    |      |      |      |      | 2                            |
| California scorpionfish |              |      |      |      | 1    |      |      | 1                            |
| Round stingray          |              |      |      |      |      | 1    |      | 1                            |
| Shiner perch            |              |      |      |      |      | 1    |      | 1                            |
| Shovelnose guitarfish   |              |      |      |      | 1    |      |      | 1                            |
| Thornback               |              |      |      | 1    |      |      |      | 1                            |
| Quarterly total         | 66           | 332  | 216  | 269  | 282  | 282  | 165  | 1612                         |

## Appendix E.2 *continued*

| Name                    | April 2008 |      |      |      |      |      |      | Total abundance<br>by survey |
|-------------------------|------------|------|------|------|------|------|------|------------------------------|
|                         | SD15       | SD16 | SD17 | SD18 | SD19 | SD20 | SD21 |                              |
| Speckled sanddab        | 152        | 241  | 136  | 152  | 260  | 265  | 209  | 1415                         |
| Yellowchin sculpin      | 5          | 15   | 84   | 69   | 16   | 12   | 20   | 221                          |
| Roughback sculpin       | 24         | 39   | 39   | 26   | 42   | 35   | 9    | 214                          |
| Hornyhead turbot        | 8          | 16   | 6    | 4    | 6    | 4    | 6    | 50                           |
| Longspine combfish      |            | 34   | 3    | 5    | 2    | 2    | 4    | 50                           |
| English sole            | 3          | 3    | 7    | 13   | 7    | 13   | 2    | 48                           |
| Longfin sanddab         |            | 4    | 9    | 11   | 9    | 7    | 7    | 47                           |
| California tonguefish   |            | 3    | 2    | 1    |      | 3    | 7    | 16                           |
| Plainfin midshipman     | 1          | 12   |      | 1    | 2    |      |      | 16                           |
| California lizardfish   |            | 1    | 4    | 1    | 4    |      | 3    | 13                           |
| California scorpionfish | 2          |      | 1    |      | 1    |      | 1    | 5                            |
| California halibut      |            |      |      | 1    | 1    |      |      | 2                            |
| Curlfin sole            | 2          |      |      |      |      |      |      | 2                            |
| Fantail sole            | 1          | 1    |      |      |      |      |      | 2                            |
| Pacific sanddab         |            | 1    |      | 1    |      |      |      | 2                            |
| California skate        |            | 1    |      |      |      |      |      | 1                            |
| Kelp pipefish           |            |      |      |      | 1    |      |      | 1                            |
| Pink seaperch           |            |      |      |      |      |      | 1    | 1                            |
| Sarcastic fringehead    |            |      |      | 1    |      |      |      | 1                            |
| Shovelnose guitarfish   | 1          |      |      |      |      |      |      | 1                            |
| Spotted cusk-eel        |            |      |      |      |      | 1    |      | 1                            |
| Spotted turbot          | 1          |      |      |      |      |      |      | 1                            |
| Quarterly total         | 200        | 371  | 291  | 286  | 351  | 341  | 270  | 2110                         |

## Appendix E.2 *continued*

| Name                    | July 2008 |      |      |      |      |      |      | Total abundance<br>by survey |
|-------------------------|-----------|------|------|------|------|------|------|------------------------------|
|                         | SD15      | SD16 | SD17 | SD18 | SD19 | SD20 | SD21 |                              |
| Speckled sanddab        | 56        | 132  | 86   | 69   | 169  | 125  | 57   | 694                          |
| Yellowchin sculpin      |           | 11   | 81   | 31   | 28   | 20   | 14   | 185                          |
| Roughback sculpin       | 4         | 13   | 33   |      | 34   | 66   | 22   | 172                          |
| Longfin sanddab         |           | 4    | 7    | 4    | 14   | 12   | 14   | 55                           |
| California lizardfish   | 1         | 13   | 16   | 6    | 2    | 6    | 7    | 51                           |
| Hornyhead turbot        | 3         | 4    | 1    | 5    | 4    | 3    | 4    | 24                           |
| English sole            | 1         |      |      | 1    | 7    | 7    | 3    | 19                           |
| Longspine combfish      |           |      |      |      | 1    | 1    | 10   | 12                           |
| California scorpionfish |           |      | 3    | 1    |      | 1    | 6    | 11                           |
| California tonguefish   |           | 2    |      |      | 1    | 3    | 1    | 7                            |
| Bigmouth sole           |           |      | 3    |      |      | 1    |      | 4                            |
| California halibut      | 1         | 1    |      |      | 1    |      | 1    | 4                            |
| Spotted turbot          |           |      |      | 2    | 1    | 1    |      | 4                            |
| Plainfin midshipman     |           |      |      |      |      | 3    |      | 3                            |
| Barred sand bass        |           |      |      |      | 1    |      |      | 1                            |
| Calico rockfish         |           |      |      |      |      |      | 1    | 1                            |
| California skate        | 1         |      |      |      |      |      |      | 1                            |
| Fantail sole            |           | 1    |      |      |      |      |      | 1                            |
| Giant kelpfish          |           |      |      |      |      | 1    |      | 1                            |
| Pink seaperch           |           |      |      |      |      | 1    |      | 1                            |
| Pygmy poacher           |           |      |      |      |      | 1    |      | 1                            |
| Slimy snailfish         |           |      |      |      |      | 1    |      | 1                            |
| Quarterly total         | 67        | 181  | 230  | 119  | 263  | 249  | 144  | 1253                         |

## Appendix E.2 *continued*

| Name                    | October 2008 |            |            |            |             |            |             | Total abundance<br>by survey |
|-------------------------|--------------|------------|------------|------------|-------------|------------|-------------|------------------------------|
|                         | SD15         | SD16       | SD17       | SD18       | SD19        | SD20       | SD21        |                              |
| Pacific pompano         |              |            |            |            |             | 485        |             | 485                          |
| Speckled sanddab        | 26           | 43         | 44         | 47         | 112         | 35         | 7           | 314                          |
| Yellowchin sculpin      |              | 4          | 37         | 20         | 38          | 15         | 2           | 116                          |
| Yellowfin croaker       |              |            |            |            |             |            | 98          | 98                           |
| California lizardfish   | 4            | 11         | 14         | 11         | 6           | 21         | 16          | 83                           |
| Roughback sculpin       | 2            | 8          | 10         | 5          | 25          | 16         |             | 66                           |
| Longfin sanddab         |              | 2          | 1          | 5          | 8           | 6          | 1           | 23                           |
| Hornyhead turbot        | 1            | 2          | 3          | 3          | 1           | 2          | 2           | 14                           |
| California scorpionfish |              |            | 4          | 4          |             |            | 3           | 11                           |
| Queenfish               |              |            |            |            |             |            | 10          | 10                           |
| Specklefin midshipman   |              |            | 3          |            | 1           | 3          |             | 7                            |
| California tonguefish   |              |            | 1          |            |             | 2          | 1           | 4                            |
| Plainfin midshipman     | 1            | 2          |            |            |             |            |             | 3                            |
| English sole            | 1            |            |            | 1          |             |            |             | 2                            |
| Fantail sole            | 1            |            |            |            |             | 1          |             | 2                            |
| Pink seaperch           |              |            |            |            |             |            | 2           | 2                            |
| California halibut      |              |            | 1          |            |             |            |             | 1                            |
| California skate        |              |            |            | 1          |             |            |             | 1                            |
| Deepwater blenny        |              |            | 1          |            |             |            |             | 1                            |
| Pygmy poacher           |              |            |            |            | 1           |            |             | 1                            |
| Shiner perch            |              |            |            |            |             |            | 1           | 1                            |
| Spotted turbot          | 1            |            |            |            |             |            |             | 1                            |
| Quarterly total         | 35           | 72         | 121        | 97         | 191         | 102        | 628         | 1246                         |
| <b>Annual Total</b>     | <b>368</b>   | <b>956</b> | <b>858</b> | <b>771</b> | <b>1087</b> | <b>974</b> | <b>1207</b> | <b>6221</b>                  |

## Appendix E.3

Summary of biomass (kg) by species and station for demersal fishes at the SBOO stations during 2008.

| Name                    | January 2008 |      |      |      |      |      |      | Total biomass<br>by survey |
|-------------------------|--------------|------|------|------|------|------|------|----------------------------|
|                         | SD15         | SD16 | SD17 | SD18 | SD19 | SD20 | SD21 |                            |
| Speckled sanddab        | 0.4          | 1.5  | 1.4  | 1.7  | 2.3  | 1.8  | 1.0  | 10.1                       |
| California halibut      |              |      | 3.6  | 0.3  |      |      | 3.0  | 6.9                        |
| Longspine combfish      |              | 0.3  | 0.1  | 0.5  | 0.2  | 0.3  | 0.4  | 1.8                        |
| California skate        |              | 0.8  | 0.9  |      |      |      |      | 1.7                        |
| English sole            | 0.3          |      | 0.3  | 0.4  | 0.1  | 0.2  | 0.4  | 1.7                        |
| Hornyhead turbot        |              | 0.1  | 0.5  | 0.3  | 0.4  | 0.1  | 0.2  | 1.6                        |
| Roughback sculpin       | 0.1          | 0.3  | 0.2  | 0.3  | 0.3  | 0.2  | 0.1  | 1.5                        |
| Longfin sanddab         |              | 0.2  | 0.1  | 0.9  |      |      |      | 1.2                        |
| Thornback               |              |      |      | 1.2  |      |      |      | 1.2                        |
| California lizardfish   | 0.1          | 0.2  | 0.1  | 0.3  |      | 0.2  | 0.1  | 1.0                        |
| California scorpionfish |              |      |      |      |      | 0.9  |      | 0.9                        |
| Fantail sole            | 0.4          |      |      |      |      |      | 0.3  | 0.7                        |
| Round stingray          |              |      |      |      |      |      | 0.7  | 0.7                        |
| California tonguefish   |              | 0.1  | 0.1  | 0.1  | 0.1  | 0.1  |      | 0.5                        |
| Specklefin midshipman   | 0.1          | 0.1  |      | 0.1  | 0.1  |      |      | 0.4                        |
| Kelp pipefish           | 0.1          | 0.1  |      |      |      |      |      | 0.2                        |
| Plainfin midshipman     |              | 0.1  |      |      |      | 0.1  |      | 0.2                        |
| Shiner perch            |              |      |      |      |      | 0.1  |      | 0.1                        |
| Shovelnose guitarfish   |              |      |      |      | 0.1  |      |      | 0.1                        |
| Yellowchin sculpin      |              | 0.1  |      |      |      |      |      | 0.1                        |
| Quarterly total         | 1.3          | 3.6  | 7.7  | 6.0  | 3.6  | 3.9  | 6.5  | 32.6                       |

## Appendix E.3 *continued*

| Name                    | April 2008 |      |      |      |      |      |      | Total biomass<br>by survey |
|-------------------------|------------|------|------|------|------|------|------|----------------------------|
|                         | SD15       | SD16 | SD17 | SD18 | SD19 | SD20 | SD21 |                            |
| Speckled sanddab        | 1.2        | 2.0  | 1.1  | 1.5  | 2.5  | 2.1  | 1.7  | 12.1                       |
| Longfin sanddab         |            | 0.3  | 0.7  | 1.0  | 0.6  | 0.5  | 0.5  | 3.6                        |
| English sole            | 0.5        | 0.2  | 0.3  | 1.1  | 0.5  | 0.8  | 0.1  | 3.5                        |
| California scorpionfish | 1.5        |      | 0.6  |      | 0.1  |      | 0.6  | 2.8                        |
| Hornyhead turbot        | 0.2        | 0.6  | 0.5  | 0.3  | 0.2  | 0.3  | 0.6  | 2.7                        |
| Roughback sculpin       | 0.2        | 0.3  | 0.2  | 0.2  | 0.5  | 0.3  | 0.1  | 1.8                        |
| Longspine combfish      |            | 0.9  | 0.1  | 0.1  | 0.1  | 0.1  | 0.1  | 1.4                        |
| Yellowchin sculpin      | 0.1        | 0.1  | 0.4  | 0.3  | 0.1  | 0.1  | 0.1  | 1.2                        |
| California lizardfish   |            | 0.1  | 0.2  | 0.1  | 0.3  |      | 0.2  | 0.9                        |
| California halibut      |            |      |      | 0.4  | 0.4  |      |      | 0.8                        |
| Shovelnose guitarfish   | 0.5        |      |      |      |      |      |      | 0.5                        |
| California tonguefish   |            | 0.1  | 0.1  | 0.1  |      | 0.1  | 0.1  | 0.5                        |
| Plainfin midshipman     | 0.1        | 0.2  |      | 0.1  | 0.1  |      |      | 0.5                        |
| Spotted turbot          | 0.3        |      |      |      |      |      |      | 0.3                        |
| Fantail sole            | 0.1        | 0.2  |      |      |      |      |      | 0.3                        |
| Pacific sanddab         |            | 0.1  |      | 0.1  |      |      |      | 0.2                        |
| California skate        |            | 0.1  |      |      |      |      |      | 0.1                        |
| Curlfin sole            | 0.1        |      |      |      |      |      |      | 0.1                        |
| Kelp pipefish           |            |      |      | 0.1  |      |      |      | 0.1                        |
| Pink seaperch           |            |      |      |      |      | 0.1  |      | 0.1                        |
| Sarcastic fringehead    |            |      |      | 0.1  |      |      |      | 0.1                        |
| Spotted cuskeel         |            |      |      |      |      | 0.1  |      | 0.1                        |
| Quarterly total         | 4.8        | 5.2  | 4.2  | 5.4  | 5.5  | 4.3  | 4.3  | 33.7                       |

## Appendix E.3 *continued*

| Name                    | July 2008 |      |      |      |      |      |      | Total biomass<br>by survey |
|-------------------------|-----------|------|------|------|------|------|------|----------------------------|
|                         | SD15      | SD16 | SD17 | SD18 | SD19 | SD20 | SD21 |                            |
| Speckled sanddab        | 0.7       | 1.4  | 1.0  | 0.8  | 2.0  | 1.4  | 0.6  | 7.9                        |
| California halibut      | 1.0       | 0.6  |      |      | 1.4  |      | 0.7  | 3.7                        |
| Longfin sanddab         |           | 0.3  | 0.4  | 0.3  | 0.9  | 0.7  | 0.8  | 3.4                        |
| California scorpionfish |           |      |      | 1.2  | 0.3  |      | 0.2  | 3.1                        |
| Hornyhead turbot        | 0.2       | 0.5  | 0.1  | 0.7  | 0.5  | 0.3  | 0.5  | 2.8                        |
| Roughback sculpin       | 0.1       | 0.1  | 0.3  |      | 0.4  | 0.8  | 0.3  | 2.0                        |
| English sole            | 0.2       |      |      | 0.2  | 0.6  | 0.5  | 0.4  | 1.9                        |
| California skate        | 1.8       |      |      |      |      |      |      | 1.8                        |
| California lizardfish   | 0.1       | 0.3  | 0.2  | 0.1  | 0.2  | 0.2  | 0.3  | 1.4                        |
| Yellowchin sculpin      |           | 0.1  | 0.3  | 0.1  | 0.2  | 0.2  | 0.2  | 1.1                        |
| Longspine combfish      |           |      |      |      | 0.1  | 0.1  | 0.9  | 1.1                        |
| Spotted turbot          |           |      |      | 0.4  | 0.2  | 0.3  |      | 0.9                        |
| Barred sand bass        |           |      |      |      | 0.8  |      |      | 0.8                        |
| Bigmouth sole           |           |      | 0.3  |      |      | 0.2  |      | 0.5                        |
| California tonguefish   |           | 0.1  |      |      | 0.1  | 0.2  | 0.1  | 0.5                        |
| Plainfin midshipman     |           |      |      |      |      | 0.2  |      | 0.2                        |
| Calico rockfish         |           |      |      |      |      |      | 0.1  | 0.1                        |
| Fantail sole            |           | 0.1  |      |      |      |      |      | 0.1                        |
| Giant kelpfish          |           |      |      |      |      |      | 0.1  | 0.1                        |
| Pink seaperch           |           |      |      |      |      |      | 0.1  | 0.1                        |
| Pygmy poacher           |           |      |      |      |      |      | 0.1  | 0.1                        |
| Slimy snailfish         |           |      |      |      |      |      | 0.1  | 0.1                        |
| Quarterly total         | 4.1       | 3.5  | 3.8  | 2.9  | 7.4  | 5.3  | 6.7  | 33.7                       |

## Appendix E.3 *continued*

| Name                    | October 2008 |             |             |             |             |             |             | Total biomass<br>by survey |
|-------------------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|----------------------------|
|                         | SD15         | SD16        | SD17        | SD18        | SD19        | SD20        | SD21        |                            |
| Yellowfin croaker       |              |             |             |             |             |             | 8.6         | 8.6                        |
| Pacific pompano         |              |             |             |             |             |             | 6.3         | 6.3                        |
| California scorpionfish |              |             | 1.3         | 1.7         |             |             | 0.7         | 3.7                        |
| Speckled sanddab        | 0.1          | 0.5         | 0.5         | 0.5         | 0.9         | 0.2         | 0.1         | 2.8                        |
| California halibut      |              |             | 2.7         |             |             |             |             | 2.7                        |
| California lizardfish   | 0.1          | 0.8         | 0.3         | 0.3         | 0.2         | 0.4         | 0.4         | 2.5                        |
| Longfin sanddab         |              | 0.1         | 0.1         | 0.4         | 0.4         | 0.4         | 0.1         | 1.5                        |
| Hornyhead turbot        | 0.2          | 0.1         | 0.3         | 0.2         | 0.2         | 0.2         | 0.2         | 1.4                        |
| California skate        |              |             |             | 1.0         |             |             |             | 1.0                        |
| Roughback sculpin       | 0.1          | 0.1         | 0.1         | 0.1         | 0.3         | 0.2         |             | 0.9                        |
| Yellowchin sculpin      |              | 0.1         | 0.1         | 0.1         | 0.3         | 0.1         | 0.1         | 0.8                        |
| English sole            |              | 0.4         |             | 0.2         |             |             |             | 0.6                        |
| Queenfish               |              |             |             |             |             |             | 0.5         | 0.5                        |
| Specklefin midshipman   |              |             | 0.2         |             | 0.1         | 0.1         |             | 0.4                        |
| California tonguefish   |              |             | 0.1         |             |             | 0.1         | 0.1         | 0.3                        |
| Fantail sole            | 0.1          |             |             |             |             | 0.1         |             | 0.2                        |
| Plainfin midshipman     |              | 0.1         | 0.1         |             |             |             |             | 0.2                        |
| Spotted turbot          | 0.2          |             |             | 0.1         |             |             |             | 0.2                        |
| Deepwater blenny        |              |             | 0.1         |             |             |             |             | 0.1                        |
| Pink seaperch           |              |             |             |             |             |             | 0.1         | 0.1                        |
| Pygmy poacher           |              |             |             |             | 0.1         |             |             | 0.1                        |
| Shiner perch            |              |             |             |             |             | 0.1         |             | 0.1                        |
| Quarterly total         | 0.8          | 2.2         | 5.9         | 4.5         | 2.4         | 1.9         | 17.3        | 35.0                       |
| <b>Annual Total</b>     | <b>11.0</b>  | <b>14.5</b> | <b>21.6</b> | <b>18.8</b> | <b>18.9</b> | <b>15.4</b> | <b>34.8</b> | <b>135.0</b>               |

## Appendix E.4

Summary of the top three species that discriminate between each cluster group according to SIMPER analyses (i.e., dissimilarity  $\geq 1.5$ ). Values are average dissimilarity between groups for that species; CL=California lizardfish, CS=California scorpionfish, CT=Californina tonguefish, ES=English sole, HT=hornyhead turbot, LS=longfin sanddab, RS=roughback sculpin, SS=speckled sanddab, YS=yellowchin sculpin.

|   | A                                   | B                                   | C                                   | D                                   | E                                   | F                                  |
|---|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|------------------------------------|
| B | CL    YS    LS<br>22.34  4.50  4.21 |                                     |                                     |                                     |                                     |                                    |
| C | CL    SS    YS<br>26.75  5.45  5.09 | LS    SS    CT<br>8.76  6.64  3.45  |                                     |                                     |                                     |                                    |
| D | CL    SS    YS<br>17.66  7.33  4.72 | SS    YS    LS<br>8.19  5.40  4.67  | YS    SS    RS<br>6.99  5.52  4.67  |                                     |                                     |                                    |
| E | CL    SS    YS<br>20.09  7.98  4.88 | SS    CL    LS<br>10.11  6.40  4.70 | SS    LS    CL<br>19.08  9.17  8.60 | SS    YS    CL<br>17.64  6.17  5.27 |                                     |                                    |
| F | CL    SS    YS<br>29.81  5.85  5.44 | LS    SS    CT<br>9.00  8.14  3.62  | SS    CL    HT<br>18.21  3.60  3.51 | SS    YS    CL<br>16.80  7.66  5.55 | CL    LS    SS<br>10.28  9.47  5.36 |                                    |
| G | CL    SS    YS<br>27.43  8.46  5.80 | SS    LS    HT<br>11.26  9.35  5.02 | SS    CL    HT<br>23.51  6.84  4.53 | SS    YS    RS<br>20.33  8.18  5.65 | LS    CL    ES<br>9.90  8.36  6.22  | CL    HT    SS<br>8.87  5.41  6.18 |

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## Appendix E.5

List of megabenthic invertebrate taxa captured during 2008 at SBOO stations. Data are number of individuals (n). Taxonomic arrangement from SCAMIT 2008.

| Taxon/ Species                   | n  |
|----------------------------------|----|
| <b>CNIDARIA</b>                  |    |
| ANTHOZOA                         |    |
| ALCYONACEA                       |    |
| Plexauridae                      |    |
| <i>Thesea</i> sp B               | 1  |
| PENNATULACEA                     |    |
| Virgulariidae                    |    |
| <i>Stylatula elongata</i>        | 1  |
| <b>MOLLUSCA</b>                  |    |
| GASTROPODA                       |    |
| Calliostomatidae                 |    |
| <i>Calliostoma canaliculatum</i> | 1  |
| <i>Calliostoma gloriosum</i>     | 1  |
| Turbinidae                       |    |
| <i>Megastraea turbanica</i>      | 1  |
| HYPSOGASTROPODA                  |    |
| Naticidae                        |    |
| <i>Euspira lewisii</i>           | 1  |
| Bursidae                         |    |
| <i>Crossata californica</i>      | 2  |
| Buccinidae                       |    |
| <i>Kelletia kelletii</i>         | 5  |
| OPISTHOBRANCHIA                  |    |
| Philinidae                       |    |
| <i>Philine auriformis</i>        | 5  |
| Onchidorididae                   |    |
| <i>Acanthodoris brunnea</i>      | 8  |
| Arminidae                        |    |
| <i>Armina californica</i>        | 1  |
| Tritoniidae                      |    |
| <i>Tritonia diomedea</i>         | 1  |
| Dendronotidae                    |    |
| <i>Dendronotus frondosus</i>     | 1  |
| <i>Dendronotus iris</i>          | 1  |
| Flabellinidae                    |    |
| <i>Flabellina iodinea</i>        | 2  |
| <i>Flabellina pricei</i>         | 1  |
| CEPHALOPODA                      |    |
| TEUTHIDA                         |    |
| Loliginidae                      |    |
| <i>Doryteuthis opalescens</i>    | 2  |
| OCTOPODA                         |    |
| Octopodidae                      |    |
| <i>Octopus rubescens</i>         | 10 |

## Appendix E.5 *continued*

| Taxon/ Species                    | n  |
|-----------------------------------|----|
| <b>ANNELIDA</b>                   |    |
| <b>POLYCHAETA</b>                 |    |
| <b>ACICULATA</b>                  |    |
| Aphroditidae                      |    |
| <i>Aphrodita</i> sp               | 2  |
| Polynoidae                        |    |
| <i>Halosydna latior</i>           | 5  |
| <b>ARTHROPODA</b>                 |    |
| <b>MALACOSTRACA</b>               |    |
| <b>STOMATOPODA</b>                |    |
| Hemisquillidae                    |    |
| <i>Hemisquilla californiensis</i> | 16 |
| <b>ISOPODA</b>                    |    |
| Cymothoidae                       |    |
| <i>Elthusa vulgaris</i>           | 6  |
| <b>DECAPODA</b>                   |    |
| Sicyoniidae                       |    |
| <i>Sicyonia ingentis</i>          | 1  |
| Hippolytidae                      |    |
| <i>Heptacarpus palpator</i>       | 1  |
| <i>Heptacarpus stimpsoni</i>      | 1  |
| Pandalidae                        |    |
| <i>Pandalus danae</i>             | 2  |
| <i>Pandalus platyceros</i>        | 2  |
| Crangonidae                       |    |
| <i>Crangon alaskensis</i>         | 2  |
| <i>Crangon alba</i>               | 1  |
| <i>Crangon nigromaculata</i>      | 62 |
| Palinuridae                       |    |
| <i>Panulirus interruptus</i>      | 1  |
| Diogenidae                        |    |
| <i>Paguristes ulreyi</i>          | 1  |
| Paguridae                         |    |
| <i>Pagurus spilocarpus</i>        | 2  |
| Calappidae                        |    |
| <i>Platymera gaudichaudii</i>     | 3  |
| Leucosiidae                       |    |
| <i>Randallia ornata</i>           | 4  |
| Epiatlidae                        |    |
| <i>Loxorhynchus crispatus</i>     | 1  |
| <i>Loxorhynchus grandis</i>       | 2  |
| <i>Loxorhynchus</i> sp            | 1  |
| <i>Pugettia producta</i>          | 3  |
| <i>Pugettia richii</i>            | 1  |

## Appendix E.5 *continued*

| Taxon/ Species                   | n   |
|----------------------------------|-----|
| Inachidae                        |     |
| <i>Podochela hemphillii</i>      | 1   |
| Inachoidaidae                    |     |
| <i>Pyromaia tuberculata</i>      | 7   |
| Parthenopidae                    |     |
| <i>Heterocrypta occidentalis</i> | 13  |
| Cancridae                        |     |
| <i>Metacarcinus anthonyi</i>     | 2   |
| <i>Metacarcinus gracilis</i>     | 5   |
| <i>Romaleon antennarius</i>      | 4   |
| Pinnotheridae                    |     |
| <i>Pinnixa franciscana</i>       | 1   |
| <b>ECHINODERMATA</b>             |     |
| <b>ASTEROIDEA</b>                |     |
| <b>PAXILLOSIDA</b>               |     |
| Luidiidae                        |     |
| <i>Luidia armata</i>             | 3   |
| Astropectinidae                  |     |
| <i>Astropecten verrilli</i>      | 353 |
| <b>FORCIPULATIDA</b>             |     |
| Asteriidae                       |     |
| <i>Pisaster brevispinus</i>      | 25  |
| <b>OPHIUROIDEA</b>               |     |
| <b>OPHIURIDA</b>                 |     |
| Ophiotrichidae                   |     |
| <i>Ophiothrix spiculata</i>      | 5   |
| <b>ECHINOIDEA</b>                |     |
| <b>TEMNOPLEUROIDA</b>            |     |
| Toxopneustidae                   |     |
| <i>Lytechinus pictus</i>         | 20  |
| <b>CLYPEASTEROIDA</b>            |     |
| Dendrasteridae                   |     |
| <i>Dendraster terminalis</i>     | 92  |
| <b>SPATANGOIDA</b>               |     |
| Loveniidae                       |     |
| <i>Lovenia cordiformis</i>       | 2   |

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## Appendix E.6

Summary of total abundance by species and station for megabenthic invertebrates at the SBOO stations during 2008.

| Name                              | January 2008 |      |      |      |      |      |      | Total abundance<br>by survey |
|-----------------------------------|--------------|------|------|------|------|------|------|------------------------------|
|                                   | SD15         | SD16 | SD17 | SD18 | SD19 | SD20 | SD21 |                              |
| <i>Astropecten verrilli</i>       | 10           | 2    | 8    | 6    | 9    | 9    | 4    | 48                           |
| <i>Crangon nigromaculata</i>      |              | 14   | 2    | 2    | 11   | 8    | 7    | 44                           |
| <i>Hemisquilla californiensis</i> |              | 3    | 1    | 2    |      | 1    | 1    | 8                            |
| <i>Pisaster brevispinus</i>       | 1            |      |      | 2    |      |      | 5    | 8                            |
| <i>Romaleon antennarius</i>       |              |      |      | 3    |      |      | 1    | 4                            |
| <i>Elthusa vulgaris</i>           |              |      |      | 2    |      |      |      | 2                            |
| <i>Pyromiaia tuberculata</i>      |              |      |      |      | 2    |      |      | 2                            |
| <i>Armina californica</i>         |              | 1    |      |      |      |      |      | 1                            |
| <i>Crossata californica</i>       | 1            |      |      |      |      |      |      | 1                            |
| <i>Euspira lewisi</i>             |              |      |      |      |      |      | 1    | 1                            |
| <i>Kelletia kelletii</i>          |              |      | 1    |      |      |      |      | 1                            |
| <i>Loxorhynchus crispatus</i>     |              | 1    |      |      |      |      |      | 1                            |
| <i>Lytechinus pictus</i>          |              |      |      |      | 1    |      |      | 1                            |
| <i>Megastraea turbanica</i>       |              | 1    |      |      |      |      |      | 1                            |
| <i>Pagurus spilocarpus</i>        |              | 1    |      |      |      |      |      | 1                            |
| <i>Thesea</i> sp B                | 1            |      |      |      |      |      |      | 1                            |
| Quarterly total                   | 13           | 23   | 17   | 14   | 21   | 19   | 18   | 125                          |

## Appendix E.6 *continued*

| Name                              | April 2008 |      |      |      |      |      |      | Total abundance<br>by survey |
|-----------------------------------|------------|------|------|------|------|------|------|------------------------------|
|                                   | SD15       | SD16 | SD17 | SD18 | SD19 | SD20 | SD21 |                              |
| <i>Dendraster terminalis</i>      | 83         |      |      |      |      |      |      | 83                           |
| <i>Astropecten verrilli</i>       | 56         | 4    | 1    | 6    | 4    | 5    |      | 76                           |
| <i>Crangon nigromaculata</i>      |            | 4    |      |      |      |      | 7    | 11                           |
| <i>Hemisquilla californiensis</i> |            |      |      |      | 1    | 5    | 2    | 8                            |
| <i>Pisaster brevispinus</i>       |            | 1    | 1    |      |      | 1    |      | 3                            |
| <i>Metacarcinus anthonyi</i>      |            |      |      |      | 1    | 1    |      | 2                            |
| <i>Crangon alaskensis</i>         | 2          |      |      |      |      |      |      | 2                            |
| <i>Lovenia cordiformis</i>        | 2          |      |      |      |      |      |      | 2                            |
| <i>Flabellina iodinea</i>         |            |      | 1    |      |      |      |      | 1                            |
| <i>Halosydna latior</i>           |            |      |      |      |      | 1    |      | 1                            |
| <i>Luidia armata</i>              |            |      |      |      |      | 1    |      | 1                            |
| <i>Octopus rubescens</i>          |            |      |      |      |      |      | 1    | 1                            |
| <i>Ophiothrix spiculata</i>       |            |      |      |      |      |      | 1    | 1                            |
| <i>Platymera gaudichaudii</i>     |            |      |      |      |      | 1    |      | 1                            |
| <i>Pyromnia tuberculata</i>       |            |      |      |      |      | 1    |      | 1                            |
| <i>Randallia ornata</i>           |            | 1    |      |      |      |      |      | 1                            |
| <i>Sicyonia ingentis</i>          |            |      |      |      |      |      | 1    | 1                            |
| <i>Tritonia diomedea</i>          | 1          |      |      |      |      |      |      | 1                            |
| Quarterly total                   | 144        | 10   | 3    | 6    | 6    | 16   | 12   | 197                          |

## Appendix E.6 *continued*

| Name                             | July 2008 |      |      |      |      |      |      | Total abundance<br>by survey |
|----------------------------------|-----------|------|------|------|------|------|------|------------------------------|
|                                  | SD15      | SD16 | SD17 | SD18 | SD19 | SD20 | SD21 |                              |
| <i>Astropecten verrilli</i>      | 79        | 4    | 2    | 8    | 5    | 5    |      | 103                          |
| <i>Lytechinus pictus</i>         | 4         |      |      | 5    |      |      |      | 9                            |
| <i>Pisaster brevispinus</i>      |           |      | 2    | 2    | 3    |      | 2    | 9                            |
| <i>Octopus rubescens</i>         |           |      |      |      |      | 6    |      | 6                            |
| <i>Dendraster terminalis</i>     | 4         |      |      |      |      |      |      | 4                            |
| <i>Halosydna latior</i>          | 1         |      | 1    |      |      | 1    |      | 3                            |
| <i>Heterocrypta occidentalis</i> |           |      | 2    | 1    |      |      |      | 3                            |
| <i>Kelletia kelletii</i>         |           |      |      | 3    |      |      |      | 3                            |
| <i>Ophiothrix spiculata</i>      |           |      |      | 1    |      |      | 2    | 3                            |
| <i>Pugettia producta</i>         |           |      |      |      |      |      | 3    | 3                            |
| <i>Pyromaia tuberculata</i>      | 1         |      |      |      |      | 2    |      | 3                            |
| <i>Elthusa vulgaris</i>          |           | 1    |      |      |      | 1    |      | 2                            |
| <i>Pandalus platyceros</i>       |           |      |      |      |      |      | 2    | 2                            |
| <i>Randallia ornata</i>          |           | 2    |      |      |      |      |      | 2                            |
| <i>Acanthodoris brunnea</i>      |           |      |      | 1    |      |      |      | 1                            |
| <i>Calliostoma canaliculatum</i> |           |      |      |      | 1    |      |      | 1                            |
| <i>Crangon alba</i>              | 1         |      |      |      |      |      |      | 1                            |
| <i>Dendronotus frondosus</i>     |           |      |      | 1    |      |      |      | 1                            |
| <i>Flabellina iodinea</i>        |           |      | 1    |      |      |      |      | 1                            |
| <i>Loxorhynchus grandis</i>      |           |      |      |      |      | 1    |      | 1                            |
| <i>Loxorhynchus</i> sp           |           |      |      | 1    |      |      |      | 1                            |
| <i>Luidia armata</i>             |           |      |      | 1    |      |      |      | 1                            |
| <i>Pagurus spilocarpus</i>       |           |      |      | 1    |      |      |      | 1                            |
| <i>Pandalus danae</i>            |           |      |      |      |      | 1    |      | 1                            |
| <i>Pinnixa franciscana</i>       |           |      |      |      | 1    |      |      | 1                            |
| <i>Platymera gaudichaudii</i>    |           |      | 1    |      |      |      |      | 1                            |
| <i>Pugettia richii</i>           |           |      |      |      |      | 1    |      | 1                            |
| <i>Stylatula elongata</i>        |           |      | 1    |      |      |      |      | 1                            |
| Quarter                          | 90        | 7    | 14   | 21   | 10   | 7    | 20   | 169                          |

## Appendix E.6 *continued*

| Name                             | October 2008 |           |           |           |           |           |           | Total abundance<br>by survey |
|----------------------------------|--------------|-----------|-----------|-----------|-----------|-----------|-----------|------------------------------|
|                                  | SD15         | SD16      | SD17      | SD18      | SD19      | SD20      | SD21      |                              |
| <i>Astropecten verrilli</i>      | 58           | 18        | 14        | 13        | 13        | 2         | 8         | 126                          |
| <i>Heterocrypta occidentalis</i> |              |           |           | 6         | 1         |           | 3         | 10                           |
| <i>Lytechinus pictus</i>         |              |           | 2         | 8         |           |           |           | 10                           |
| <i>Acanthodoris brunnea</i>      |              |           | 1         | 6         |           |           |           | 7                            |
| <i>Crangon nigromaculata</i>     |              |           |           | 1         | 3         | 3         |           | 7                            |
| <i>Metacarcinus gracilis</i>     |              |           |           | 3         |           |           | 2         | 5                            |
| <i>Dendraster terminalis</i>     | 2            |           | 1         | 2         |           |           |           | 5                            |
| <i>Philine auriformis</i>        |              |           | 2         | 2         | 1         |           |           | 5                            |
| <i>Pisaster brevispinus</i>      |              | 1         |           | 1         |           | 1         | 2         | 5                            |
| <i>Octopus rubescens</i>         |              |           | 2         |           |           | 1         |           | 3                            |
| <i>Aphrodisia sp</i>             |              |           |           | 2         |           |           |           | 2                            |
| <i>Elthusa vulgaris</i>          | 2            |           |           |           |           |           |           | 2                            |
| <i>Doryteuthis opalescens</i>    |              |           |           |           |           | 2         |           | 2                            |
| <i>Calliostoma gloriosum</i>     |              |           |           |           |           |           | 1         | 1                            |
| <i>Crossata californica</i>      |              |           |           |           | 1         |           |           | 1                            |
| <i>Dendronotus iris</i>          |              | 1         |           |           |           |           |           | 1                            |
| <i>Flabellina pricei</i>         |              |           |           | 1         |           |           |           | 1                            |
| <i>Halosydna latior</i>          | 1            |           |           |           |           |           |           | 1                            |
| <i>Heptacarpus palpator</i>      |              |           | 1         |           |           |           |           | 1                            |
| <i>Heptacarpus stimpsoni</i>     |              |           | 1         |           |           |           |           | 1                            |
| <i>Kelletia kelletii</i>         | 1            |           |           |           |           |           |           | 1                            |
| <i>Loxorhynchus grandis</i>      |              |           |           |           | 1         |           |           | 1                            |
| <i>Luidia armata</i>             |              |           |           | 1         |           |           |           | 1                            |
| <i>Ophiothrix spiculata</i>      |              | 1         |           |           |           |           |           | 1                            |
| <i>Paguristes ulreyi</i>         |              |           |           |           |           | 1         |           | 1                            |
| <i>Pandalus danae</i>            |              |           | 1         |           |           |           |           | 1                            |
| <i>Panulirus interruptus</i>     |              |           |           |           |           |           | 1         | 1                            |
| <i>Platymera gaudichaudii</i>    |              |           | 1         |           |           |           |           | 1                            |
| <i>Podochela hemphillii</i>      | 1            |           |           |           |           |           |           | 1                            |
| <i>Pyromnia tuberculata</i>      |              |           | 1         |           |           |           |           | 1                            |
| <i>Randallia ornata</i>          |              | 1         |           |           |           |           |           | 1                            |
| Quarterly total                  | 65           | 21        | 28        | 46        | 19        | 11        | 17        | 207                          |
| <b>Annual Total</b>              | <b>312</b>   | <b>61</b> | <b>62</b> | <b>87</b> | <b>56</b> | <b>53</b> | <b>67</b> | <b>698</b>                   |